

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - FEB 2023**

Semester : Semester I - 2022

Course Code : PHY1001

Course Name : Sem I - PHY1001 - Material Physics

Program : B.Tech - (All Programs)

Date : 21-FEB-2023

Time : 1.00PM - 4.00PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(10 X 2 = 20M)

1. In which type of dislocation an extra plane is inserted inside the crystal -----
a) Screw dislocation (CO1) [Knowledge]
b) Edge dislocation
c) Jog dislocation
d) Mixed dislocation
2. Which of the following has small packing fraction ----
a) Simple Cubic (CO1) [Knowledge]
b) Body centered cubic
c) Face centered cubic
d) All have equal packing fraction
3. Malleability is the property of a material to be formed into _____
a) Wires (CO2) [Knowledge]
b) Sheets
c) Billets
d) Bars

4. The indenter used in Brinell hardness test is a -----
a) Steel or tungsten carbide ball (CO2) [Knowledge]
b) Cone shape indenter
c) Cylinder shape indenter
d) Pyramid shape indenter
5. When Au and Co are electrically connected, which one gets corroded (CO3) [Knowledge]
a) Cu
b) Au
c) Can't decide
d) None
6. What type of corrosion take place ----- when dissimilar metals are physically joined in the presence of an electrolyte (CO3) [Knowledge]
a) Uniform corrosion
b) Erosion corrosion
c) Galvanic corrosion
d) Grain corrosion
7. Identify the one dimensional nano-materials----- (CO4) [Knowledge]
a) Size of the particle greater than 100 nm
b) Carbon nanotubes
c) Graphite sheet
d) Size of the particle less than 2 nm in all directions
8. Units of strain ----- (CO2) [Knowledge]
a) Meters
b) Pascal
c) Newton
d) Dimension less
9. Difficult to monitor and very dangerous form of corrosion ----- (CO3) [Knowledge]
a) Galvanic
b) Pitting
c) Uniform
d) Stress corrosion
10. Nano film is an example of ----- (CO4) [Knowledge]
a) Zero dimension nanomaterial
b) One dimension nanomaterial
c) Two dimension nanomaterial
d) Three dimension nanomaterial

PART B

ANSWER ALL THE QUESTIONS

(5 X 10 = 50M)

11. (a) Explain the differences between Resilience and Toughness. (5 marks)
(b) Find the stress acting on a rod of diameter 0.1 meters which is supporting a mass of 100kg over it? (Assume the rod is massless) (5 Marks)
(CO2) [Comprehension]
12. (a) What is thermopile? What principle is behind this thermopile?
(b) The thermal conductivity of copper is 390 W/m/K. Calculate the rate of heat flow through a copper bar whose area is 4cm^2 and whose length 0.50 m, if there is a temperature difference of $30\text{ }^\circ\text{C}$ maintained between its ends.
(CO3) [Comprehension]
13. (a) What is carbon nanotube? How to classify the carbon nanotubes? (3 marks)
(b) Explain the properties and uses of carbon nanotubes? (7 Marks)
(CO4) [Comprehension]
14. (a) What is Seebeck effect? write the difference between Seebeck and Peltier effects.
(b) A metal rod is 64.522 cm long at $12\text{ }^\circ\text{C}$ and 64.576 cm at $90\text{ }^\circ\text{C}$. Find the coefficient of linear expansion of its material.
(CO3) [Comprehension]
15. (a) How nanomaterials are different from bulk materials. Do you think that nanotechnology impacts our life? Justify.
(b) Write applications of carbon nano tubes.
(CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 15 = 30M)

16. (a) The Bragg's angle in the first order for (220) reflection from nickel is 38.2° . When X-Rays of wavelength 1.54 angstrom are employed in a diffraction experiment, determine the lattice parameter of nickel. (9 marks)
(b) Draw the (112) (120) (222) and (110) planes and the [011] [010] and [112] directions of a simple cubic crystal. (6 Marks)
(CO1) [Application]
17. (a) On increasing the length by 0.5 mm in a steel wire of length 2 m and area of cross-section 2mm^2 , the force required is? [Y for steel $2.2 \times 10^{11}\text{ N/m}^2$] (6 Marks)
(b) Explain the stress-strain curve with the figure. What mechanical properties can calculate from the figure? (6 marks)
(c) A body has been compressed by 1/10th of its initial volume than the volumetric strain on the body is----- (3 marks)
(CO2) [Application]